Iowa Mathematics

Grade 4

Operations and Algebraic Thinking 4.OA

1 Use the four operations with whole numbers to solve problems. 4.OA.A

1 Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations. For example, write 35 = 7 x 5 to represent the statement that a 35-foot-long whale shark is 7 times as long as a 5-footlong reef shark. 4.OA.A.1

2 Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Be able to use drawings and equations with a variable for the unknown number to represent the problem. For example, Tom's pencil is 4 times as long as Julie's pencil. Tom's pencil is 8 inches long. How long is Julie's pencil? (multiplicative comparison) For example, Julie's pencil is 2 inches long. Tom's pencil is 8 inches long. How much longer is Tom's pencil than Julie's pencil? (additive comparison) 4.OA.A.2

3 Solve multistep word problems posed with whole numbers and whole-number answers using the four operations, including problems in which remainders must be interpreted. Be able to represent word problems with mathematical diagrams and with equations in which a letter stands for an unknown quantity and be able to assess the reasonableness of answers using mental computation and estimation strategies including rounding. 4.OA.A.3

2 Gain familiarity with factors and multiples. 4.OA.B

1 Be able to find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. 4.OA.B.4

3 Analyze a number sequence that follows a given rule. 4.OA.C

1 Given the rule for a sequence of numbers, identify apparent features of the sequence that were not explicit in the rule itself; explain informally why the numbers will continue to alternate in this way. For example, given the rule "Add 3" and the number sequence 1, 4, 7, 10, 13 observe that the terms appear to alternate between odd and even numbers; 4.OA.C.5

Numbers and Operations in Base Ten 4.NBT

1 Generalize place value understanding for multi-digit whole numbers up to 1,000,000. 4.NBT.A

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1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what that same digit represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division. 4.NBT.A.1
2. Read and write whole multi-digit numbers using base-ten numerals (standard form), number names (word form), and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. 4.NBT.A.2
3. Use place value understanding to round multi-digit whole numbers to any place. For example, 435,450 rounded to the nearest tenthousands place is 440,000 because it is more than halfway between 430,000 and 440,000. 4.NBT.A.3

2 Calculate with multi-digit numbers. 4.NBT.B

1. Fluently add and subtract multi-digit whole numbers up to 1,000,000 using an algorithm. Algorithms may include the standard algorithm, partial sums, partial differences, counting or adding up in increments. Note: Fluency of this standard is critical by the end of grade level. 4.NBT.B.4
2. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Be able to illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.NBT.B.5
3. Find whole-number quotients and remainders with up to fourdigit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. 4.NBT.B.6

Numbers and Operations–Fractions 4.NF

1 Extend understanding of fraction equivalence and ordering. 4.NF.A

1. Illustrate and explain numerical statements of fraction equivalence by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and write equivalent fractions. 4.NF.A.1
2. Compare two fractions with different numerators and different denominators, by creating common denominators or numerators, comparing to a benchmark fraction such as 1 2 and/or by using a visual fraction model. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions. 4.NF.A.2

2 Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. 4.NF.B

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1 Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$. For example, $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$. 4.NF.B.3

a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF.B.3.A

b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Be able to justify decompositions. For example, by using a visual fraction model. 4.NF.B.3.B

c Add and subtract mixed numbers with like denominators and show sums and differences of mixed numbers on a number line diagram. 4.NF.B.3.C

d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, by using visual fraction models and or equations to represent the problem. 4.NF.B.3.D

2 Apply and extend earlier understandings of multiplication to multiply a fraction by a whole number. 4.NF.B.4

a Using a visual fraction model, understand a fraction with a numerator greater than 1 is a multiple of a unit fraction. For example, using a number line to show $\frac{5}{4}$ as the product of $5 \times \frac{1}{4}$. 4.NF.B.4.A

b Multiply a fraction by a whole number using the principle that the product is the whole number times the numerator of the fraction with the same denominator. 4.NF.B.4.B

c Solve word problems involving multiplication of a fraction by a whole number. Use visual fraction models and/or equations to represent the problem. 4.NF.B.4.C

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3 Understand decimal notation for fractions for tenths and hundredths. 4.NF.C

1 Express a fraction with denominator 10 as an equivalent fraction with denominator 100 and use this technique to add two fractions with respective denominators 10 and 100. For example, express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$. Note: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators is not a requirement at this grade. 4.NF.C.5

2 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as $\frac{62}{100}$ and locate 0.62 on a number line. 4.NF.C.6

3 Compare two decimals to hundredths by reasoning about their size, recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole. Show decimals on a number line diagram and be able to justify numerical statements of decimal comparison by using a visual fraction model. 4.NF.C.7

Measurement and Da

1 Solve problems involving conversion of measurements from a larger unit to a maller unit. 4.MD.A

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1. Know relative sizes of measurement units within one system of measurement, including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit by using multiplication. For example, record measurement equivalents in a two-column table, know that 1 ft is 12 times as long as 1 in or express the length of a 4 ft snake as 48 in. 4.MD.A.1
2. Use the four operations to solve word problems involving distances, intervals of time (including elapsed time), liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. 4.MD.A.2
3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. 4.MD.A.3

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2 **Represent and interpret data using a line plot.** 4.MD.B

1. Make a line plot to display a data set of measurements using the fractions of a unit. ($12, 14, 18$). 4.MD.B.4
   a. $8, 28, 38, 48, 58, 68, 78, 88$ 4.MD.B.4.A
   b. $4, 24, 34, 44$ 4.MD.B.4.B
   c. $12, 22$ 4.MD.B.4.C

   Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest pencils in a collection.

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3 **Geometric measurement: understand the concept of angle and measure angles.** 4.MD.C

1. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: 4.MD.C.5
   a. An angle is measured with reference to a circle with its center at the common endpoint of the angle's rays. An angle that turns through 1 360 of a circle is called a "one-degree angle," and can be used to measure angles. 4.MD.C.5.A
   b. An angle that turns through n one-degree angles is said to have an angle measure of $n°$. For example, an angle that turns through 45 one-degree angles has an angle measure of 45 degrees. 4.MD.C.5.B
2. Draw and measure angles in whole-number degrees (1–180°) using a protractor. Sketch angles of specified measure. 4.MD.C.6
3. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems. For example, by using an equation with a symbol for the unknown angle measure. 4.MD.C.7

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Geometry 4.G

1. **Draw and identify lines and angles, and classify shapes by properties of their lines and angles.** 4.G.A
    1. Draw points, lines, line segments, rays, angles (acute, right, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. 4.G.A.1
    2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles. 4.G.A.2
    3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. 4.G.A.3